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Cercosporella bundelkhandae comb. nov. from India

Raghvendra Singh[1*], Sanjeet Kumar Verma[1],
Sanjay Yadav[1], Shambhu Kumar[2]

[1] *Centre of Advanced Study in Botany, Institute of Science, Banaras Hindu University, Varanasi, Uttar Pradesh, India 221005*

[2] *Forest Pathology Department, KSCSTE-Kerala Forest Research Institute, Peechi, Thrissur, Kerala, India 680653*

[*] Correspondence to: *drsinghtaxon@gmail.com, singhr.bot@bhu.ac.in*

Abstract—The new combination *Cercosporella bundelkhandae* (≡ *Pseudocercosporella bundelkhandae*) is proposed, based on critical morphological re-examination of the holotype specimen and fresh topotypic material and comparison with closely related species of cercosporoid hyphomycetes. The species was originally collected on living leaves of *Tinospora sinensis* from Jhansi, Utttar Pradesh, India.

Key words—anamorph, *Capnodiales, Mycosphaerellaceae,* nomenclature, taxonomy

Introduction

The hyphomycetous ramularioid complex (*Mycosphaerellaceae*, *Capnodiales*) comprises genera with colourless conidiophores and conidia. The morphologically most similar genera of this complex are *Cercosporella* Sacc., *Pseudocercosporella* Deighton, and *Ramularia* Unger. The taxonomic problems presented by this complex were discussed by Braun (1990, 1991a,b, 1994, 1995, 1998), Kirschner (2009), Crous & al. (2001a,b), Verkley & al. (2004), and Videira & al. (2016). In *Cercosporella* the conidial scars and hilum are thickened while in *Ramularia* they are only slightly thickened. These criteria however are somewhat subjective and, in many descriptions, become merged or modified as 'slightly thickened and darkened' or 'refractive.' These difficulties explain the frequent transfers of *Cercosporella* species to *Ramularia* and vice versa. Scanning electron microscopy has shown that conidiogenous loci are smooth (a flat conidiogenous locus shaped as a truncated cone) in *Cercosporella* but resemble *Cladosporium*-type loci (consisting of a circular rim and a central dome) in *Ramularia* (Kirschner 2009, Bensch & al. 2012). Braun (1995) separated *Cercosporella* into two subgenera—*C.* subg. *Cercosporella* and *C.* subg. *Pseudovellosiella* U. Braun—based on the presence or absence of secondary superficial mycelium and development of conidiophores from stromata or secondary superficial mycelia or both. *Cercosporella* are primarily hyaline, although in tropical and subtropical countries, some *Cercosporella* species occur with olivaceous or pale olivaceous-brown stromata and coloured conidiophore bases (Braun 1995).

A large number of ramularioid fungi have been recombined in the genus *Cercosporella* from all over the world (Braun 1992, 1993; Davis 1919, 1924; Deighton 1973; Höhnel 1924; Magnus 1906; Saccardo 1895). Recently, additional ramularioid species have been described from India (Awasthi & al. 2016, Singh & al. 2008), suggesting that the diversity of such fungi is still insufficiently known in this region.

During a survey of the Jhansi region of Uttar Pradesh in 2018, a colourless foliicolous hyphomycete found on leaves of *Tinospora sinensis*, was identified as species of *Cercosporella* subg. *Cercosporella* due to presence of prominent thickened conidial scars and hilum. A literature survey revealed that this fungus had been described earlier as *Pseudocercosporella bundelkhandae* (Shrivastava & al. 2009). As the fungus is characterized by thickened scars and colourless conidiophores and conidia and the absence of secondary superficial mycelium and solitary conidiophores, it is taxonomically worthwhile to transfer the species into *Cercosporella* subg. *Cercosporella*.

Materials & methods

The holotype specimen [conserved in the Herbarium, Division of Mycology & Plant Pathology, Indian Agricultural Research Institute, New Delhi, India (HCIO)] and a fresh specimen collected from living *T. sinensis* leaves from the type locality [conserved in the Mycological Herbarium, Banaras Hindu University, Varanasi, India (MH-BHU)] were examined in lacto-glycerol-cotton blue using an Olympus Magnus CH20i-TR light microscope. At least 50 measurements of each fungal structure were taken for taxonomic diagnoses. Histological sections were prepared in order to observe the relationship between the fungus and the host tissue. The fungus was compared with closely related cercosporoid taxa by the help of current literature.

Taxonomy

Cercosporella bundelkhandae (S. Shrivast., N. Verma & A.N. Rai) Raghv. Singh, S.K. Verma, S. Yadav & Sh. Kumar, **comb. nov.** FIG. 1

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≡ *Pseudocercosporella bundelkhandae* S. Shrivast., N. Verma & A.N. Rai, J. Mycol. Pl. Pathol. 39(2): 305 (2009)

(Description based on type material): INFECTION SPOTS amphigenous, circular to irregular, 3–10 mm in diam., initially hyaline, then becoming very light- to mid-brown. COLONIES amphigenous, effuse. Mycelium internal. STROMATA well developed, immersed, pseudo-parenchymatous, hyaline to olivaceous or light olivaceous-brown, 35–50 µm in diam. CONIDIOPHORES macronematous, 5–10 fasciculate, sometimes synnematous, unbranched, erect to procumbent, straight to flexuous, geniculate, smooth, 2–5-septate, thick-walled, hyaline, (18–)50–80(–85) × 2.5–5(–7) µm. CONIDIOGENOUS CELLS integrated, terminal, polyblastic, sympodial, mostly conspicuously geniculate, cylindrical, usually swollen at apex; loci thickened, darkened, outwardly bulging, 2–3.5 µm wide. CONIDIA simple, solitary, acropleurogenous, obclavate-cylindrical, ellipsoid, straight to slightly curved, apex subacute, base subconic-truncate, dry, smooth, thin walled, 1–4-septate, hyaline, (10–)20–55(–65) × (2–)3–6(–8.5) µm, hilum thickened, 2–3.5 µm wide.

SPECIMEN EXAMINED: INDIA, UTTAR PRADESH, Jhansi, on leaves of *Tinospora cordifolia* (Willd.) Miers [= *T. sinensis* (Lour.) Merr. (*Menispermaceae*)], 10 December 2010, leg. S. Jain (HCIO 44091, holotype); Jhansi, 25.4484°N 78.5685°E, on living leaves of *Tinospora sinensis*, December 2018, leg. Raghvendra Singh (MH-BHU 9).

Discussion

Cercosporoid fungi previously reported on *Tinospora* hosts include: *Cercospora madhauliensis* Kamal & al.; *Cercosporella dioscoreophylli* (Henn.) Deighton; *Passalora menispermi* (Ellis & Holw.) U. Braun & Crous; *Pseudocercospora cocculi* (Syd.) Deighton; *Ps. tinosporae* A.N. Rai & Kamal; *Ps. tinosporicola* U. Braun & Bagyan.; and *Ps. tinosporigena* U. Braun (Deighton 1973, 1976; Braun & Crous 2005; Crous & Braun 2003; Bagyanarayana & Braun 1992; Rai & Kamal 1989; Kamal & al. 1987).

Molecular sequence data have already confirmed that the presence/absence of thickened and darkened conidiogenous loci, slightly thickened and darkened or refractive scars (refractivity indicating the absence of scar), presence/absence of conidiophore and conidial pigmentation, and planate/pileate thickened dark conidiogenous loci are taxonomically important

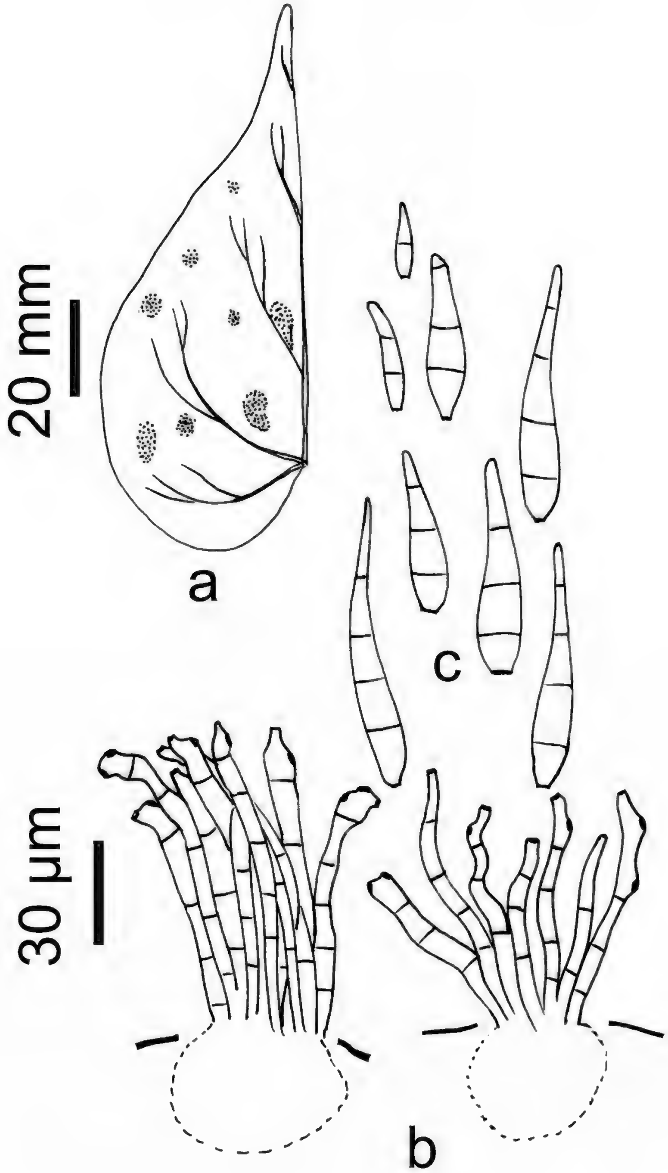

Fig. 1. *Cercosporella bundelkhandae* (holotype, HCIO 44091):
a. Symptoms; b. Stromata with fascicle of conidiophores and conidiogenous cells; c. Conidia.

features (Crous 1999; Untereiner 2000; Crous & al. 2000, 2001a,b; Pretorius & al. 2003; Stewart & al. 1999; Taylor & al. 2003).

Cercosporella bundelkhandae differs from *Cercospora madhauliensis*, *P. menispermi*, *Ps. cocculi*, *Ps. tinosporae*, *Ps. tinosporicola*, and *Ps. tinosporigena* because they all have either coloured conidiophores or coloured conidia or both.

Due to its hyaline nature, *Cercosporella bundelkhandae* shows a close resemblance to *C. dioscoreophylli*, distinguished by its longer (180 × 3–5.5 µm) branched conidiophores and longer, pluriseptate conidia (25–80 × 3–7.5 µm, 1–6-septate).

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